Image Processing Device, Image Processing Method, and Memory Medium

[画像処理装置、画像処理方法及び記憶媒体]

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Scope of Claims

Claim 1

An image processing device comprising a detection means that

detects the maximum print count embedded in an image that contains

copyright information; an acquisition means that acquires

information for the purpose of specifying said image; an obtainment

means that obtains the total print count data for said image from

the information used to identify said image; a control means that

controls the printout of said image based on said total print count

data and said maximum print count data.

Claim 2

An image processing device as claimed in Claim 1 further

characterized by the fact that said maximum print count data is

electronically embedded as a digital watermark in said image or

described by means of XML.

Claim 3

An image processing device as claimed in Claim 1 further characterized by the fact that said control means prints said image if said total print count has not reached said maximum print count.

Claim 4

An image processing device as claimed in Claim 1 further characterized in that said total print count data is recorded in association with the data used to identify said image.

Claim 5

An image processing device characterized by the fact that said detection means and acquisition means are realized in the form of a printer driver.

Claim 6

An image processing device as claimed in Claim 1 further

characterized in that the data used to identify said image is either

embedded as a digital watermark in said image or described using XML.

Claim 7

An image processing device as claimed in Claim 1 further

characterized by the fact that said total print count data is stored

in the printer section together with data used to identify said image.

Claim 8

The image processing device as claimed in Claim 1 further

characterized by the fact that said control means does not perform

printing if said total print count is equal to said maximum print

count.

Claim 9

An image processing device characterized by the fact that information used to specify said total print count data and said image is stored in a nonvolatile memory medium.

Claim 10

An image processing device characterized by the fact that it comprises a detection means to detect the permissible print page count and a control means that allows printing of said image if said detected image page count data is 1 or greater.

Claim 11

An image processing device as claimed in Claim 10 further characterized by the fact that said permissible print page count is described using XML or an electronic watermark.

Claim 12

An image processing device as claimed in Claim 10 further

characterized by the fact that after said printing is performed, said

permissible print count is reduced and is then once again embedded

in said image.

Claim 13

An image processing device as claimed in Claim 10 further

characterized by the fact that in said printed image an electric

watermark is embedded so as to indicate the fact it is an image with

a copyright affixed thereto.

Claim 14

An image processing device as claimed in Claim 10 further

characterized by the fact that when copying a file corresponding to

said image, in both the original file of said image and its copy,

said permissible print page count is assigned.

Claim 15

An image processing method that performs the processing in said image processing devices of Claims 1 – 14.

Claim 16

A memory medium that stores the code for the purpose of realizing the image processing of method claimed in Claim 15.

[0001]

Detailed Description of the Invention

The present invention pertains to an image processing device, an image processing method, and a storage medium.

[0002]

Prior Art

There have been voices calling for a means to protect the rights of images that contain copyrights. The prior art lacks a printing

device that determines whether an image to be printed has copyright

information, and based on that determination, to control printing.

[0003]

Problems Solved by the Present Invention

The prior art contains technologies that realize the illicit

duplication of bills whereby a printing device determines the nature

of an image and prevents it from being printed out. However, in the

case of images that contain a copyright, there is a need for more

flexible print control. Rather than categorically preventing the

printout of the entire image, the system should allow someone to print

out an image up to a certain page count if the image contents were

obtained by paying a fair price. Further, when the page count has

been exceeded, printing should no longer be permitted.

[0004]

The present invention aims to resolve these issues and make it

possible to more flexibly control printing of an image that contains

a copyrighted image.

[0005]

Means Taken to Resolve the Problems

In order to resolve the above problems, the present invention

comprises a detection means that detects the maximum print count data

for said image embedded in the image, an acquisition means for

acquiring data to identify said image, an acquisition means to

acquire the total print count data for said identified image, and

a control means to control the printing of said image from said

maximum print count data and said total print count data.

[0006]

Embodiments of the Invention

An embodiment of the present invention is described in detail

below with reference to the figures.

[0007]

First, an outline of a sample embodiment shall be described.

[0008]

In the present embodiment, in response to a print command from an application, a printing device reads in, from an image, copyright information that was added in a specified form such as a digital watermark. The embodiment comprises a copyright deciphering means that abstracts a unique image ID for that image from within the copyright information, and a print count database generation means that stores, in nonvolatile memory inside the printer, a database of print counts for copyrighted images, treating the image ID abstracted by the copyright information deciphering means and the total print count printed by this printing device up to the present time as paired data. The image ID abstracted by the copyright information deciphering means, the maximum print count for the image,

and the total print count up to the present time in the print count

database stored in the printer's nonvolatile memory are compared.

A judgment is made to determine whether to allow printing for the

image to be printed. If the printout is disallowed on account of the

maximum print count retained by the image, then the user is notified

to the effect that printing cannot be performed. By suspending print

processing in this manner, the print count for the image is

controlled.

/3

[0009]

Further, the above-described copyright data can be a digital

watermark embedded as invisible data in a specified frequency in the

image data, or as a visible digital watermark embedded in the image

data using yellow or some other color that is difficult to see. In

other words, the type of digital water mark is not specified. Further,

it is not specified whether the copyright information is added as

a digital watermark, for it can be appended as a specified pattern

or barcode or the like. Further, it can be described using eXtensible

Markup Language (XML) and added to the image. Because XML is used

in a variety of information systems, it is suitable for handling the

images of information systems 2[1].

[0010]

A concrete example shall be given below.

[0011]

Sample System Configuration 1

Figure 1 shows a first sample system configuration pertaining

to a first embodiment of the invention.

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[1] TRANSLATOR'S NOTE: Not clear what this number is doing here.

[0012]

This sample system configuration realizes a printing device and method that can protect copyrights by limiting the print count of images in a configuration containing a printer driver and printer unit in typical printing devices.

[0013]

This system configuration is composed of a host computer 01 and printer 10. Here, the printing device and method that can protect copyrights by limiting the print count of images is composed of a host computer 01 and a printer 09[2] that are connected using an interface that is capable of bidirectional communications, such as a Centronics parallel interface, USB interface, or IRDA. In addition,

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[2] TRANSLATOR'S NOTE: This reference number does not match what is shown in the figures. Note that in many cases, in contrast to the standard practice, different elements of the invention are referenced by different numbers, depending on the figure.

a print count limiting means is provided in the host computer 01 and the printer 10. Here, the print count limiting means is composed of the printer 10 and printer driver 02 on the host computer 01.

[0014]

The printer driver 02 is formed of a copyright information decipherment section 05, a print permission judgment section 07, an image data generation section 08, and a display section 03.

[0015]

The printer 10 is formed of a database management section 13 that manages the print count for each copyright image, a print count database 11 to track print counts for copyrighted images, and a printing control section 14.

[0016]

All the structural elements in the printer driver 02 are stored on a hard disk inside a computer. Moreover, it is also acceptable

to use a memory medium such as separate floppy disk.

[0017]

System Operation of Sample System Configuration 1

This example of operation shows the case where the maximum

permissible print count for an image is stored in the copyright

information added to the image.

[0018]

When the application 04 issues an image print command to the

printer driver 02, the copyright information decipherment section

05 analyzes the copyright information appended to the image, detects

a unique image ID for the image existing in the copyright information,

and passes it on to the print permission judgment section 07. Further,

this image IP[3] data can be a number uniquely added to the image or

_____

[3] TRANSLATOR'S NOTE: IP is undoubtedly a typo for ID.

data that uniquely identifies the image by irregular processing. And

at the same time, the copyright information decipherment section 05

detects the maximum permissible print count for the image, said

maximum print count being stored within the copyright information,

and then passes it on to the print permission judgment section 07.

Next, the print permission judgment section 07 compares the image

ID obtained by the copyright information decipherment section 05,

the maximum permissible print count obtained by the copyright

information decipherment section 05, and the current total print

count for the image ID obtained from the print count database

management section 13 for copyrighted images. If the print command

does not reach the maximum permissible print count, processing is

passed over to the image data generation section 08, and print

processing resumes. Moreover, if this print command exceeds the

maximum permissible print count, then on the display section 03, the

user is notified to the effect that the maximum permissible print

count saved as copyright information was exceeded, and at the same time, print processing is suspended. As a result, by appending to the image copyright information that includes the maximum permissible print count data, it is possible to restrict the print count for the image.

[0019]

Sample System Configuration 2

Figure 2 shows a second system configuration pertaining to the present invention.

[0020]

This system configuration can realize a printing device and method that can safeguard copyrights by restricting the image print count simply using a printer unit.

[0021]

This system example is composed of a printer 04 and host computer 01 connected using an interface capable of bidirectional communications such as IRDA, a USB interface, or an Centronics parallel interface. Here, the printing device and method capable of safeguarding copyrights by restricting the image's print count is composed of only a printer 04. The printer 04 is further provided with a print count limiting means. The printer 04 is composed of a copyright information decipherment section 07, a print permission judgment section 08, a display section 05, a database management section 09 to manage the print count for each copyright image, an image data generation section 10, a print count database 06 to manage each copyright image, and a print control section 11.

[0022]

Operation of Sample System Configuration 2

This example of operation shows the case where the maximum

permissible print count for an image is stored in the copyright

information appended to the image.

[0023]

When the application 02 issues, to the printer driver 03, a

command to print the image, the copyright information decipherment

means 07 analyzes the copyright information appended to the image,

\4

detects a unique image ID for the image existing within the copyright

information, and passes these on to the print permission judgment

section 08. At the same time, the copyright information decipherment

means 08 also detects the maximum permissible print count for the

image, this value being stored inside the copyright information, and

passes the value on to the print permission judgment section 08.

[0024]

Next, the print permission judgment section 08 compares the image ID acquired by the copyright information decipherment section 07, the maximum permissible print count acquired by the copyright information decipherment section 07, and the current total print count for the corresponding ID acquired from the image print count database management section 09. If the print command is within the maximum permissible print count, processing is handed over to the image data formation section 10, and print processing resumes. On the other hand, if the print command is beyond the maximum permissible print count, then the user is notified to the effect that the maximum permissible print count stored as part of the copyright information has been exceeded, and print processing is simultaneously suspended. As a result, by appending copyright information that includes maximum permissible print count data, it is possible to restrict the number of times that the image is printed.

[0025]

Judgment Control Over Whether Printing Is Permissible at the Print

Permission Judgment Section

Next, judgment control over whether a print command is

permissible is shown in the flow chart of Figure 4 for the case where

the maximum permissible print count is stored in the copyright

information appended to the image in the cases of sample system

configurations 1 and 2.

[0027]

In step S1, a check is performed to determine whether the maximum

permissible print count data for the image passed as part of the print

command from the application has been specified. In this execution

example, a check is done to see whether there is copyright information

including the maximum permissible print count in some specified form

like a digital watermark.

[0028]

In step S2, processing branches depending on the result in step S1, that is, depending on whether a maximum permissible print count data for the image is specified. In the present embodiment, processing branches depending on whether the image stores copyright information including the maximum permissible print count. In the case that the maximum permissible print count is designated for the image, processing proceeds to step 3.

[0029]

On the one hand, in step 2, if the maximum permissible print count is not specified for the image, then a judgment is made that the image can be printed any number of times without restriction, processing proceeds to step 9, and print processing resumes. At step 3, a unique Id for the image is abstracted from within the copyright information appended to the image.

[0030]

In step S4, a check is made to determine whether, within the print count database for each copyright image stored in nonvolatile memory in the printer, there is any current total print count data for the image ID abstracted in step 3 .

[0031]

In step 5, based on the check processing of step S4, processing branches depending on whether there exists a current total print count corresponding to the image ID generated in step S3. If current total print count data corresponding to the image ID does exist, processing proceeds to step S7.

[0032]

On the other hand, in step S5, if the current total print count data corresponding to the image ID abstracted in step S3 did not exist in the copyrighted image print count database, processing proceeds

to step S6.

[0033]

In step S6, it is determined that, with this print command, the image that stores copyright information is being printed for the first time. Accordingly, a table[4] having a new image ID and the current total print count of 0 is added to the print count database for each copyright information stored in a nonvolatile memory region within the printer, at which point processing proceeds to step S7.

[0034]

In step S7, processing branches depending on the result of comparing the current total print count for the image ID with the maximum permissible print count for the image. If the current total

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[4] TRANSLATOR'S NOTE: The original document uses "table" where normally one would use the term "record". Each record has two fields: the current total print count and the unique image ID. This is done repeatedly throughout the specification.

print count for the image ID has not reached the maximum permissible

print count for the image, then processing proceeds to step S8. On

the other hand, in step S7, if the total print count for the image

is not below the maximum permissible print count, then processing

proceeds to step S10.

[0035]

In step S8, the current total print count corresponding to the

image ID found in the print count database for each copyright image

is incremented to 1, and processing proceeds to step S9.

[0036]

In step S9, ultimately, a judgment is made that the printing

is within the permissible number of prints as the current total print

count does not exceed the maximum permissible print count.

[0037]

In Step S10, ultimately, a judgment is made that the printing

is not within the permissible number of prints as the current total

print count does exceed the maximum permissible print count.

Accordingly, the user is notified to the effect that the print command

exceeds the maximum permissible print count.

[0038]

In step S11, because printing is not permitted, print processing

is suspended.

[0039]

Manner of Use of Program

Next, a description of an example of how to adopt the printing

device shall be provided based on the flow chart of Figure 4 described

above.

[0040]

For example, let us assume that the following kinds of images

exist.

[0041]

Image A does not have designated maximum permissible print count.

[0042]

Image B has a maximum permissible print count of 1.

[0043]

Image C has a maximum permissible print count of 0.

[0044]

What follows is a description of the operation for the printing device in the case when each of the above images is printed two times from an application.

[0045]

Example 1: Image A is printed from the application for the first time.

Example 2: Image A is printed from the application for the second time.

A judgment is made that a maximum permissible print count is not specified for image A, and print processing resumes. Accordingly, printing terminates normally.

[0046]

Example 3: Image B is printed from the application for the first time.

A judgment is made that the maximum permissible print count for image B is equal to 1. Further, a unique image ID is abstracted from the copyright information. Because there is no corresponding image ID in the database of current total print count values in the printer's nonvolatile memory region, a table is newly added containing the image ID and a current total print count, with the latter being set to 0. Because the current total print count is equal

to 0 and therefore has not reached the maximum permissible print count

of 1, it is judged that printing is permissible, and printing

terminates normally. In addition, after the printing is performed,

the print count in the current total print count database is set to

1.

[0047]

Example 4: Image B is printed from the application for the second

time.

A judgment is made that the maximum permissible print count for

image B is equal to 1. Further, a unique image ID is abstracted from

the copyright information. Using the current total print count

database in the nonvolatile memory region of the printer, a check

determines that the current total print count for the image ID in

question is equal to 1. Because is judged that the current total print

count of 1 is not under the maximum permissible print count of 1,

a judgment is made that printing is not allowed, and the user is

notified that the maximum permissible print count has been exceeded.

Thereupon, print processing is suspended.

[0048]

Example 5: Image C is printed from the application for the first time.

A judgment is made that the maximum permissible print count for

image C is equal to 0. Further, a unique image ID is abstracted from

the copyright information. Because there is no corresponding image

ID in the database of current total print count values in the

printer's nonvolatile memory region, a table is newly added

containing the image ID and a current total print count, with the

latter being set to 0. However, because the current total print count

of 1 is not under the maximum permissible print count of 1, a judgment

is made that printing is not allowed, and the user is notified that

the maximum permissible print count has been exceeded. Thereupon,

print processing is suspended.

[0049]

Example 5: Image C is printed from the application for the second time.

A judgment is made that the maximum permissible print count for image C is equal to 0. Further, a unique image ID is abstracted from the copyright information. Using the current total print count database in the nonvolatile memory region of the printer, a check determines that the current total print count for the image ID in question is equal to 0. Because the current total print count of 1 is not under the maximum permissible print count of 1, a judgment is made that printing is not allowed, and the user is notified that the maximum permissible print count has been exceeded. Thereupon, print processing is suspended.

[0050]

As shown by the above examples, with images that have a designated maximum permissible print count, it is possible to prevent printouts that exceed that designated maximum permissible print count. Further, for images where one does not to allow even one printing, then by setting the maximum permissible print count to 0, then it becomes possible to disallow print processing altogether. Further, for images that do not have a designated maximum permissible print count, it is possible for printing to resume normally without any suspension of processing.

[0051]

From the above explanation, the merits of the present embodiment can be summarized in the following two[5] points:

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[5] TRANSLATOR'S NOTE: Judging from the list, one can see that the author intended to say "three" points.

(1) It provides a printing device that can designate the maximum

permissible print count for a given image.

(2) It provides a printing device that, by setting the maximum

permissible print count for an image to 0, can render an image

unprintable.

(3) By storing a current total print count database in a nonvolatile

memory region of the printer unit itself, then even if one tries to

print the same image from a different host computer, then for each

printer, it is possible to prevent print processing that exceeds the

maximum permissible print count.

[0052]

As explained above, for images with a designated maximum

permissible print count, when the application issues a print command,

from the image data passed as a print command from the application,

a unique image ID for the image is abstracted from the copyright

information appended in some form such as a digital watermark on the image data to be printed. Further, that image ID and the current total print count is stored as a data pair in the database in the printer's nonvolatile memory region. From this information, a comprehensive judgment is made as to whether, for the current print command, the current total print count exceeds the image's designated maximum permissible print count. And based on the judgment, it is possible to prevent printings that exceed the maximum permissible print count for the image.

[0053]

Other Embodiments of the Invention

In the explanation above, it was possible to control printing by comparing the maximum permissible print count data with the current total print count data. However, it is also acceptable to decide whether one wishes to print the image by appending print page

count information as a digital watermark or using XML, and by then

checking the printer driver at the time of printing for this

information.

[0054]

In this case, first, when the print instruction is input, the

print page count appended to the image is checked, and if this print

page count is 1 or greater, then when printing this image print page

count appended to the image is appended using XML or a digital

watermark to the image reducing only the page count portion.

[0055]

In the method for restricting the number of times something was

printed using a maximum permissible print count and a current total

print count, there is a problem in that by changing the printer used

for printing, it is possible to print something more than the maximum

number of times. However, by using permissible print page count

information, it is possible to absolutely prevent printing of more than the permissible number of page counts.

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[0056]

In addition, if one attempts to copy this file, this information is displayed in display section 03, having checked the permissible possible page count information.

[0057]

An operator can divide printing permissible page counts for the original file and copied file using a keyboard (not shown in the figure).

[0058]

For example, f the permissible print page count is 5, the operator can choose to designate 3 pages to the original file and

2 pages to the copy.

[0059]

In accordance with this instruction, the permissible print page count information is appended using XML or as a digital watermark to the original and copy.

[0060]

By adopting this configuration, then even if one makes a copy of the file, it is possible to restrict the total number of printed pages for the image in the page count established using the print page count information.

[0061]

In order to prevent the simple copying of images with a copyright by copying a printed image, one can append information to display that the image has an appended copyright in the image using a visible (e.g. yellow) or invisible digital watermark for the image printed.

[0062]

If one loads onto the copier machine a function to prevent copying by detecting digital watermarks when a printed image is read in, it will be possible to prevent the improper copying of images containing copyrights.

[0063]

In order to realize the functions of the embodiment just described, one can store in a memory medium a program that effectuates the configuration of the embodiment just described. By reading out the program stored in said memory medium as code, the processing method that executes this program in the client computer and server computer is also within the scope of the embodiment. The memory medium in which the above-described program is recorded is included in the embodiment.

[0064]

As the memory medium in question, it is possible to use a floppy disk, hard disk, optical disk, magneto-optical disk, CD-ROM, magnetic tape, nonvolatile memory card, or ROM.

[0065]

In addition, it is not necessary for the program stored in the above-mentioned memory radium to be a standalone entity. A program operating on an OS cooperating with the functions of an expansion board and other software is also included in the scope of the above-described embodiment.

[0066]

Effects of the Invention

Thanks to the present invention it is possible to flexibly control the printing of images containing copyright information in accordance with the permissible print count.

Brief Description of the Drawings

Figure 1 is a block diagram that shows a sample configuration of a printing device that constitutes a first embodiment of the present invention.

Figure 2 is a block diagram that shows a sample configuration of a printing device that constitutes a second embodiment of the present invention.

Figure 3 is an explanatory diagram of a sample database to track print counts for each copyrighted image in accordance with the present invention.

Figure 4 is a flow chart that shows the process for determining whether or not it is permissible to print an image in accordance with an embodiment of the present invention.

Figure 3
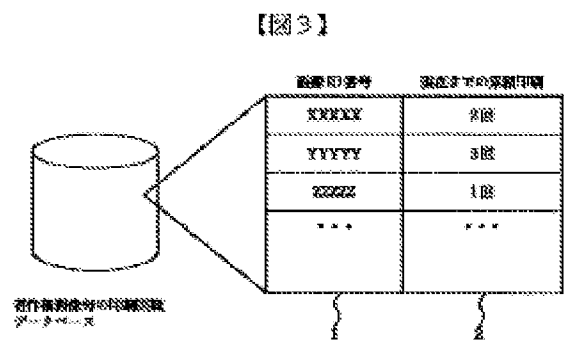
No. of times copyright image has been printed

Database

[TABLE]

Image ID No.	No. of [ILLEGIBLE] up to the present
XXXXX	2 times
YYYYY	3 times
ZZZZZ	1 time
...	...

Figure 1

01 host computer

02 printer driver

03 display section

04 application

05 copyright information decipherment section

07 print permission judgment section

08 image data generation section

09 bidirectional communications control section

Centronics Parallel Interface or the like

10 printer

11 database of print count for copyrighted images

12 bidirectional communications control section

13 section to manage database of copyrighted image print count

14 print control section

[LOWER RIGHT CORNER]

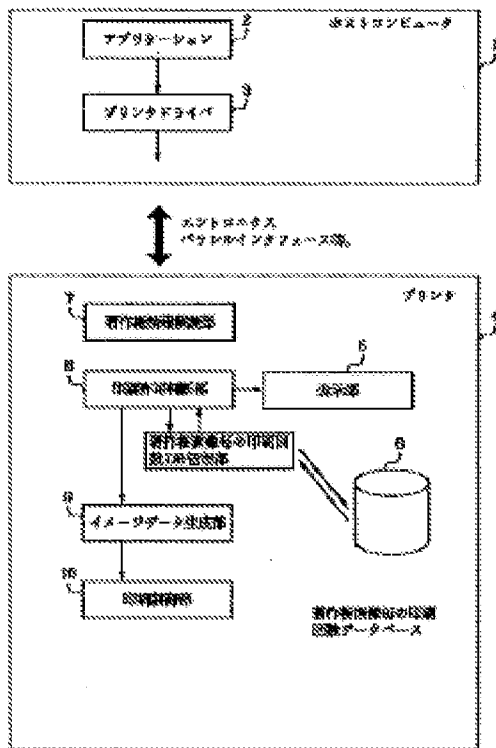database of print counts for copyrighted images

Figure 2

01 host computer

02 application

03 printer driver

[ARROW] Centronics[6] parallel interface, or the like

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[6] TRANSLATOR'S NOTE: Obvious typo Japanese: "entronics" => Centronics

04 printer

05 display section

06 database of copyrighted image print counts

07 copyright information decipherment section

08 print permission judgment section

09 image data generation section

10 print control section

[additional box connected by arrows]

section to manage the database of copyrighted image print counts
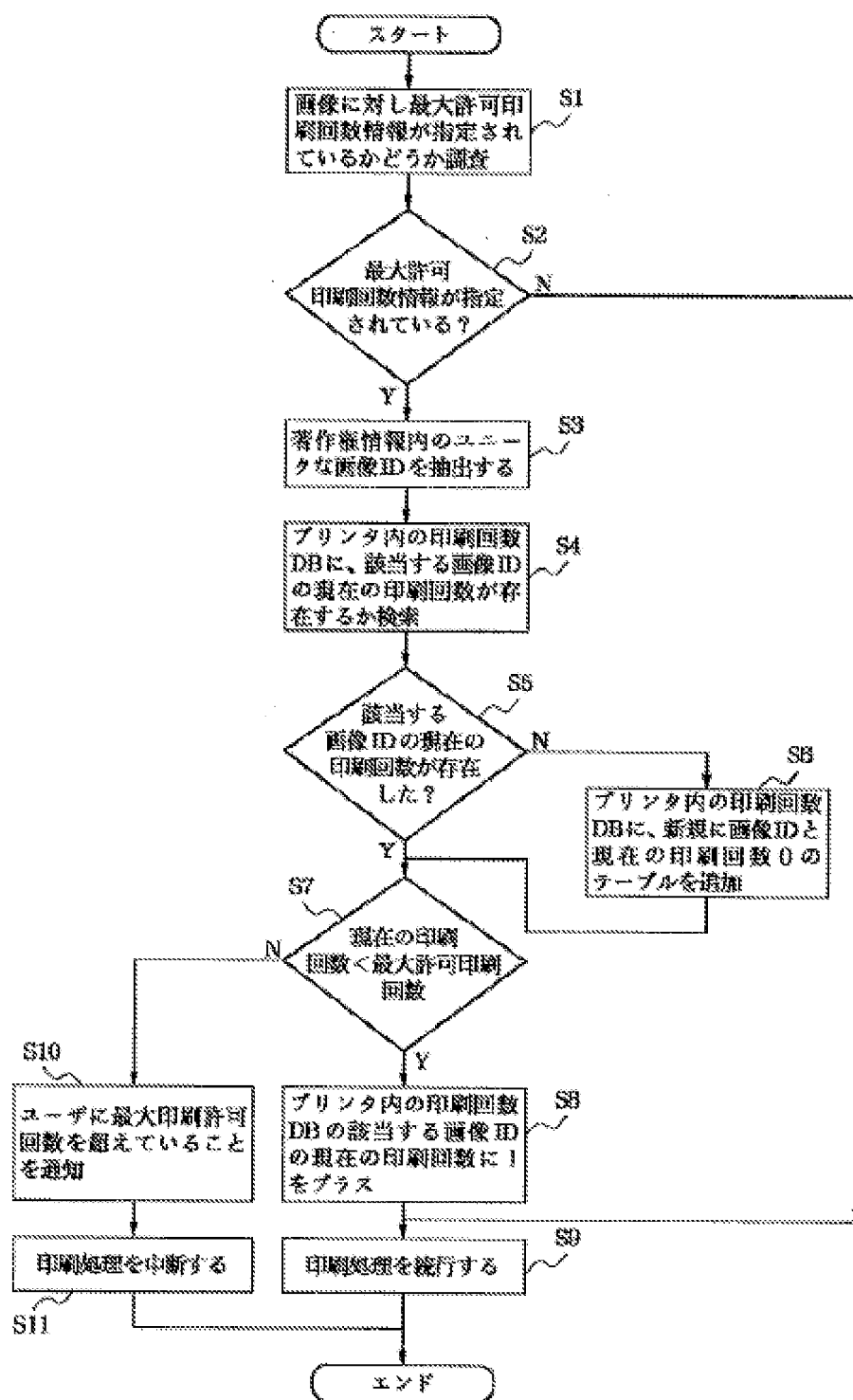
Figure 4

START

S1   Determine whether information on the maximum permissible print

     count for the image has been specified

S2   Has the maximum permissible print count for the image been

     specified?

N

Y

S3   Abstract a unique image ID from within the copyright information

S4   In the print count database inside the printer, determine

     whether there is currently a print count value corresponding

     to said image ID

S5   Said image ID currently has print count value?

N

S6   Add a new table with 0 for the current No. of prints and the

image ID in the database on No. of prints within the printer

S7   Is the current No. of prints less than the maximum permissible

print count?

Y

S8   Increment by 1 the current total print count for said image ID

in the print count database inside the primer

S9   Resume print processing

N

S10 Inform the user that the maximum permissible print count has

been exceeded

S11 Discontinue print processing

END

Continuation from Front Page

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